

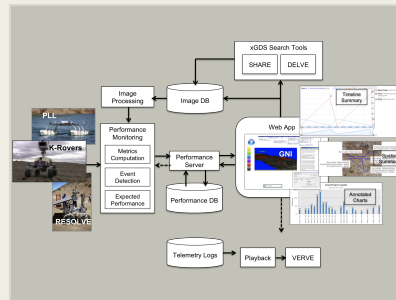
Anytime Summarization for Remote Robot Operations, Phase II

Completed Technology Project (2013 - 2016)



Project Introduction

NASA plans to use intelligent planetary rovers to improve the productivity and safety of human explorers. A key challenge in using robots for human exploration is orienting remote personnel about robot operations, as latency and communication constraints make eyes-on monitoring impractical. Summary measures are needed to identify what progress the robot has made and, when progress is impeded, to indicate what went wrong. Trending measures also are needed that determine how well robotic assets are being utilized and identify opportunities to improve robot productivity. TRAC Labs and Brigham Young University propose to develop software for anytime summarization to orient personnel quickly about the performance of planetary robots operating remotely, when data are limited, interrupted, or delayed. Thus an anytime summary must support personnel in understanding the operational situation without relying on vigilance monitoring. We successfully completed all Phase I objectives. We designed an approach for developing an anytime summarization web application. We identified candidate use cases to support Intelligent Robotics Group (IRG) tests. We designed and prototyped algorithms to summarize robot performance. We designed a web application with a graphical narrative interface (GNI) for exploring anytime summaries for different uses and perspectives. This web application integrates these interface clients with a performance data server and with the IRG Exploration Ground Data System (xGDS). In Phase II we will implement this Phase I design as a web application for anytime summarization. This software will compute and present information about robot performance including key performance indicators, significant events affecting performance, and expected performance under different operational conditions. It will build a new performance database for use by web clients, such as the GNI. This web application will be evaluated for use with NASA robots as part of the IRG xGDS.



Anytime Summarization for Remote Robot Operations Project Image

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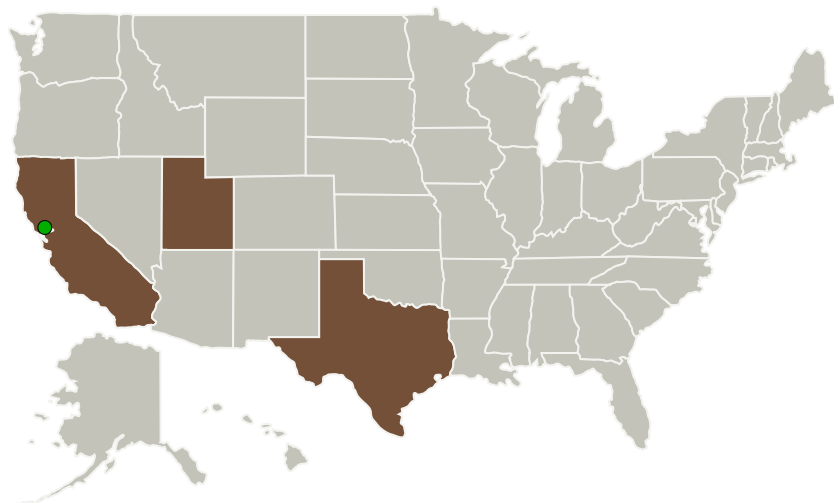
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
TRAC Labs, Inc.	Lead Organization	Industry	Webster, Texas
● Ames Research Center (ARC)	Supporting Organization	NASA Center	Moffett Field, California
Brigham Young University-Provo	Supporting Organization	Academia	Provo, Utah

Primary U.S. Work Locations	
California	Texas
Utah	

Project Transitions

July 2013: Project Start

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

TRAC Labs, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

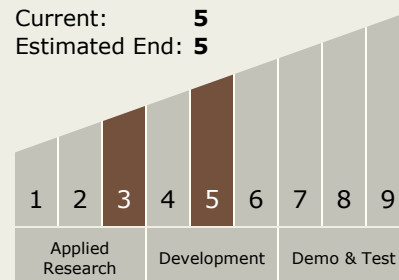
Carlos Torrez

Principal Investigator:

Debra L Schreckenghost

Technology Maturity (TRL)

Start: **3**
 Current: **5**
 Estimated End: **5**



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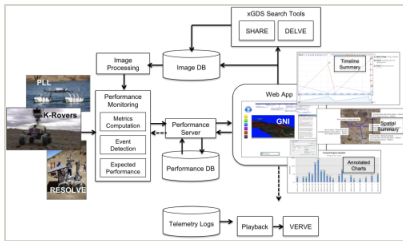


January 2016: Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/137324>)

Images



Project Image

Anytime Summarization for Remote Robot Operations Project Image
(<https://techport.nasa.gov/image/126989>)

Technology Areas

Primary:

- TX10 Autonomous Systems
 - └ TX10.2 Reasoning and Acting
 - └ TX10.2.4 Execution and Control

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System